

Sprint Review 3

Visible Light Communication (VLC)

Advanced Wireless Communication

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Outline

- 1 Project Definition
- 2 Summary of Sprint Review 1 and 2
- 3 Minimum Viable Product
- 4 Block Diagram
- 5 Testbed Setup
- 6 Results

Hybrid WiFi-Visible Light Communication Internet Access System

Current State of Project:

- Demonstration of data transfer using Visible Light.
- Generation of Empirical and Simulation Framework.

Summary of Sprint Review 1 and 2

- A Hybrid WiFi-VLC internet access system.
- As a part of Sprint Review 2, NS3 Simulation results were shown.

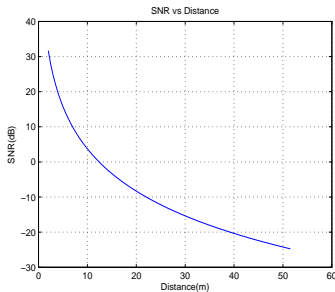


Figure : SNR versus Distance

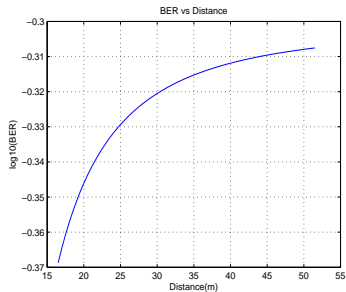


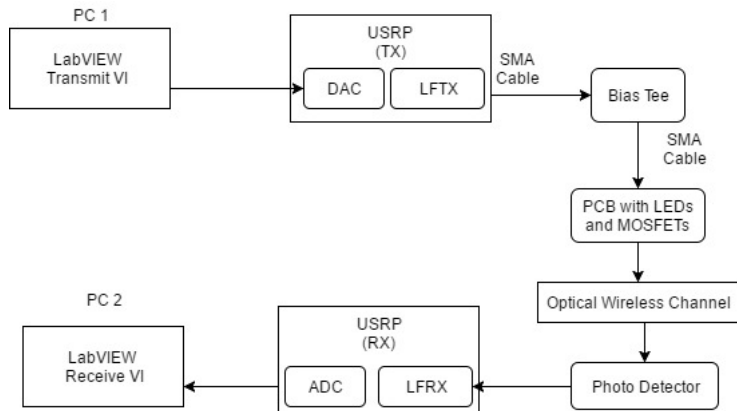
Figure : BER versus Distance

- Empirical results are discussed and demonstrated in this review.

Minimum Viable Product

- A prototype demonstrating data transmission and reception using Visible Light Communication.
- The transmitter hardware is a PCB containing LED (LUWCN5M) and MOSFETs (2n7002)
- The bias tee (ZX85-12G+) is required to shift the bipolar signal generated by the USRP such that the input to the LED driver is within the linear range of the conversion.
- The receiver hardware is a photodiode with trans-impedance amplifier (PDA36A) which is used to convert the optical signal back to the electrical domain.
- We utilize LabVIEW and USRP Hardware for empirical framework setup.

Block Diagram



Testbed Setup

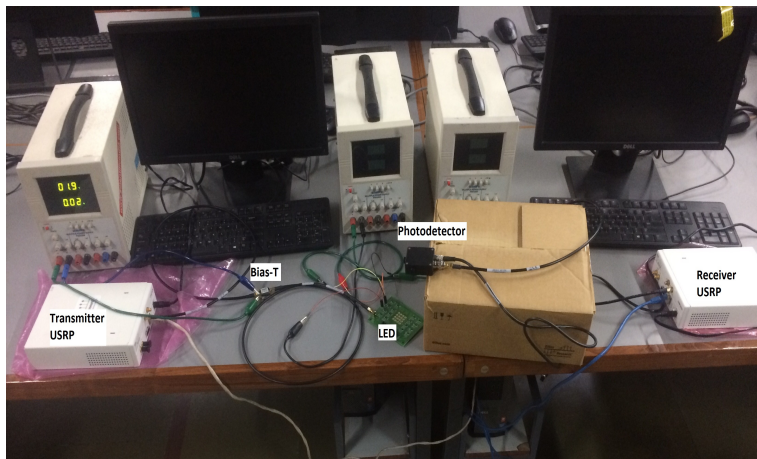


Figure : Laboratory Setup

Results

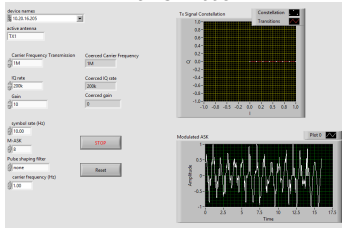
- Empirical Results for 8-ASK, 16-QAM are shown.
- Audio File Transmission using FM
- Comparison between different M'ary ASK Modulation Schemes.

Technical Risks and Limitations:

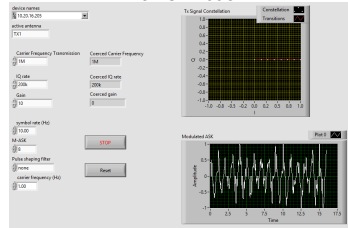
- Hardware Failure
- LOS Communication
- Unsuitable for outdoor environments

8-ASK

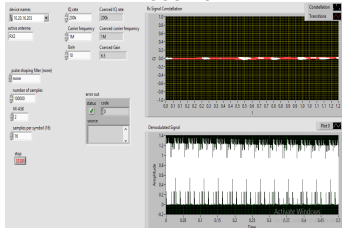
Transmitter



Transmitter

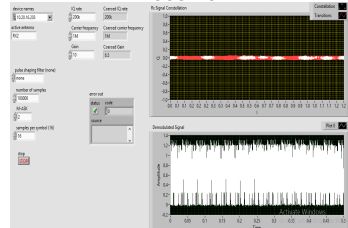


Receiver



(a) At distance = 10cm

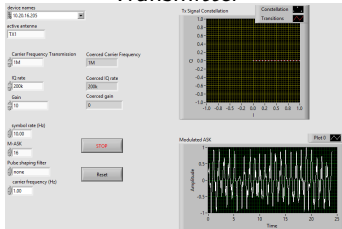
Receiver



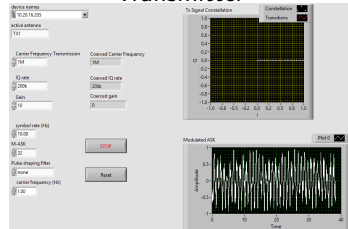
(b) At distance = 40cm

16-ASK and 32-ASK

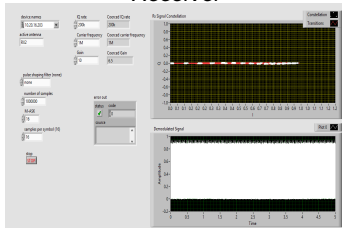
Transmitter



Transmitter

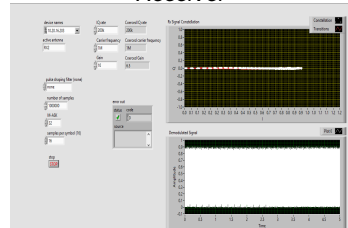


Receiver



(a) At distance = 15cm

Receiver



(b) At distance = 40cm

DEMO

THANK YOU